

## CLOSURE FOR A CONTAINER

This invention relates to a closure for a container.

- 5 Containers are commonly used to contain liquids, powders, and other consumables requiring storage or transportation.

Typically the containers are supplied with a co-operating closure to reduce the risk of a user spilling the contents should he accidentally jar or tilt the  
10 container.

In many cases the closure is reusable. However, in some instances, e.g. bottled alcoholic beverages, the container remains open once a user or third party has removed the associated closure.

15 This permits unauthorised access to the contents of the container without the knowledge or acquiescence of the container user. Such access allows a third party to remove the contents of the container or tamper with them. Instances of drugs being added to drinks in bar and club situations are well  
20 documented.

In other situations it may be desirable to restrict access to the contents (such as but not limited to acids, bleaches and other hazardous chemicals) of a container to certain, e.g. qualified, personnel.

25 It may also be desirable to prevent the addition of material to the contents of a container in order to prevent contamination of the contents.

Conventional closures do not provide a convenient and re-usable way of  
30 achieving the aforementioned functionality.

Therefore there is a need for a re-usable closure that conveniently provides a user with control over access to the contents of the container.

5 According to the invention there is provided a closure, for a container, comprising a closure member and a key member, the closure member including an opening formed in communication with a concealed sealing member, the sealing member being moveable between a closed position towards which it is resiliently biased and an open position, the opening  
10 defining a conduit for at least one of dispensing the contents of the container or adding contents to the container; the closure member further including an access channel in communication with the sealing member; and the key member including an engagement portion that is co-operable with the access channel, whereby the engagement portion is moveable  
15 within the access channel, so as to move the sealing member into the open position, when the closure member and the key member are releasably engaged together.

The provision of a key member permits a user to control access to the  
20 contents of the container. Such access can be limited to the user himself or to one or more additional, so-called, "key holders".

A further advantage of this arrangement is that the key member permits repeated access to the contents of the container without the need to remove  
25 the closure member or modify the closure member after each period of access.

Conveniently one of the engagement portion and the access channel includes at least one protrusion and the other of the engagement portion and  
30 the access channel includes at least one co-operable first recess.

The provision of at least one co-operable protrusion and recess pair allows for the generation of a large number of differing combinations of closure member and key member. In this way only a specific key member will  
5 provide access to a containers contents via a given closure member.

Optionally one of the engagement portion and the access channel includes at least one second recess in communication with a respective first recess and extending at an angle therefrom, the or each second recess including an  
10 elongate member moveably secured therein, the elongate member extending through one of the engagement portion and the closure member whereby the elongate member is moveable by a respective protrusion into engagement with the sealing member, so as to move the sealing member into the open position, when the closure member and the key member are releasably  
15 engaged together.

The inclusion of at least one elongate member disposed between the key member and the sealing member provides an additional layer of security for the closure. The use of at least one elongate member to move the sealing  
20 member prevents a third party from inserting an object into the access channel in an attempt to move the sealing member to the open position.

In a further embodiment the closure member is formed integrally with the container; and/or removably or fixedly secured to the container.  
25

Preferably the container includes a tamper-evident member disposed between the closure member and the container.

The preceding features related to the closure member provide for a closure  
30 that can be attached to existing containers without the need for modification

of the container. In addition, they allow the closure member to be formed as part of the container during the container manufacturing process.

In a preferred embodiment of the invention one of the closure member and the key member includes at least one first engagement member and the other of the closure member and the key member includes at least one further engagement member that is engageable with the first engagement member, so as to permit the releasable engagement of the key member and the closure member when the sealing member is in at least one of the open position and the closed position.

The provision of first and further engagement members allows a user to temporarily retain the key member and the closure member in engagement with one another. Such temporary engagement can occur with the sealing member in either the closed position or the open position. This helps to prevent a user from misplacing the key member during use.

In a further preferred embodiment of the invention the closure member includes a shield member that conceals the sealing member, the shield member permitting the dispensing of the contents of the container or the addition of contents to the container, but preventing a person from moving the sealing member via the conduit.

Optionally the shield member is secured within the conduit.

Alternatively the shield member includes at least one leg extending therefrom, the or each leg being receivable within a respective cavity in the sealing member, whereby the shield member is moveable against a biasing force between a position displaced from the sealing member and a position adjacent to the sealing member.

Advantageously the three foregoing features protect the sealing member from attack or unauthorised movement via the conduit.

- 5 Conveniently at least one said leg includes a first locking member that is engageable with a further locking formation in a said cavity, whereby the shield member is lockable in the position adjacent to the sealing member so as to prevent movement of the sealing member to the open position.
- 10 This prevents movement of the sealing member to an open position in the event that a third party attempts to force the shield member into the container.

Preferably the conduit includes at least one retention member, the or each  
15 retention member preventing removal of the shield member. This prevents a user or third party forceably removing the shield member from the closure member.

In a preferred embodiment of the invention the sealing member includes a  
20 substantially rigid frame, the frame including at least one spring member protruding therefrom, the or each spring member resiliently biasing the sealing member towards the closed position.

In a further preferred embodiment the sealing the sealing member further  
25 includes a first sealing portion co-operable with the conduit in the closure member to seal the conduit, and a second sealing portion arranged to prevent the dispensing of the contents of the container and the addition of contents to the container via the access channel.

Optionally the first sealing portion includes a stopper and the conduit includes a co-operable seal, the stopper and the seal combining to seal the conduit.

- 5 Such features provide for a sealing member that is easy to manufacture from readily available materials.

In a still further preferred embodiment of the invention the closure member has a substantially circular cross-sectional profile and includes a liner; the  
10 access channel has a substantially circular cross-section and is disposed between the liner and an outer wall of the closure member; and the engagement portion of the key member defines a hollow tube having a substantially circular cross-section.

- 15 Preferably the key member includes one of a spout; a nozzle; and a nipple.

The foregoing features provide a configuration that is well suited for use with existing containers, especially drinks containers. A substantially circular closure is familiar to users and is comfortable to use.

20

Conveniently the closure member includes a removeable cap. This helps to keep the conduit and access channel clean when the closure and container are not in use.

- 25 In a preferred embodiment of the invention the closure member includes at least one tamper-evident seal, the or each tamper-evident seal sealing at least one of the opening and the access channel of the closure member.

The provision of at least one tamper-evident seal allows a user to know whether the contents of the container have been tampered with before he receives or begins to use the container and closure.

- 5 There now follows a description of preferred embodiments of the invention, by way of non-limiting example, with reference being made to the accompanying drawings, in which:

Figure 1 shows a cross-sectional, elevational view of a closure  
10 according to a first embodiment of the invention;

Figure 2 shows a cross-sectional view of a key member according to the invention;

Figure 3 shows a cross-sectional view of a part of the closure member according to the invention;

15 Figures 4a to 4c show a sequence of engaging together the key member and the closure member according to the first embodiment of the invention;

Figure 4d shows a portion of the closure member including the shield member according to the first embodiment of the invention;

20 Figure 5 shows a plan view of the frame of the sealing member according to the first embodiment of the invention;

Figure 6 shows a plan view of the first and second sealing portions of the sealing member according to the first embodiment of the invention;

25 Figure 7 shows an elevational view of the sealing member according to the first embodiment of the invention;

Figure 8 shows a cross-sectional, elevational view of the liner according to the invention;

Figure 9 shows a cross-sectional, elevational view of a closure according to a second embodiment of the invention;

Figure 10 shows an enlarged, cross-sectional, view of part of the shield member and sealing member according to the second, and a third embodiment of the invention, in a first operating condition;

Figure 11 shows the arrangement of Figure 21 in a second operating  
5 condition; and

Figures 12a to 12c show an enlarged, cross-sectional, view of the operating sequence of a leg of the shield member according to the second and third embodiments of the invention;

Figure 13 shows a preferred retention member according to the  
10 second and third embodiments of the invention;

Figure 14 shows a plan view of the sealing member according to the second and third embodiments of the invention;

Figure 15 shows a plan view of part of the closure member according to the second and third embodiments of the invention;

Figures 16a to 16c show a sequence of engaging together the key  
15 member and the closure member according to the second embodiment of the invention;

Figure 17 shows a cross-sectional, elevational view of a closure according to the third embodiment of the invention;

Figures 18a to 18d show various elements of the key and closure  
20 members according to the third embodiment of the invention;

Figure 19 shows an isometric view of part of the closure member according to the third embodiment of the invention;

Figure 20 shows an exploded, elevational view of a closure  
25 according to the third embodiment of the invention;

Figures 21a to 21c show a sequence of engaging together the key member and the closure member according to the third embodiment of the invention; and

Figures 22a and 22b show an elevational view of a cap according to  
30 the invention in an open and a closed position, respectively.

Referring to the drawing figures, a known container is designated generally by the reference numeral 30. The container 30 includes a hollow body 31. Typically the container is made from glass or PET.

5

A first embodiment of the closure according to the invention is designated generally by the reference numeral 40.

10

The closure comprises a closure member 45 and a key member 50. In the embodiment shown in Figures 1 and 3 the closure member has a substantially circular cross-sectional profile, but in other embodiments of the invention this need not be so.

15

The closure 40 is or includes plastics or other materials common in the packaging art. The contents of the container with which the closure will be used will influence the choice of materials.

20

The closure member 45 includes an opening 51 that is formed in communication with a concealed sealing member 52.

The sealing member 52 is moveable between a closed position (as shown in Figure 1) towards which it is resiliently biased and an open position (as shown in Figure 4c).

25

The opening 51 defines a conduit 53 that allows the dispensing of the contents of the container 30 and the addition of contents to the container 30. In the embodiments shown the conduit 53 has circular cross-section and accounts for a substantial volume of the closure member 45. Other shapes and size of conduit 53 are also possible. In addition the key member 50 in

30

the embodiment shown includes a spout 55 formed at one end thereof. The

key member may include other types of end formation such as a nozzle or a nipple.

5 The closure member 45 also includes an access channel 54 that is in communication with the sealing member 52. In the embodiments shown the access channel 54 is substantially circular and extends adjacent to the outer surface of the closure member 45.

10 The key member 50 includes an engagement portion 56 that is co-operable with the access channel 54. The engagement portion 56 is moveable within the access channel 54. In this way the engagement portion 56 is able to move the sealing member 52 to the open position when the closure member 45 and the key member 50 are releasably engaged together.

15 In the embodiments shown the engagement portion 56 is a hollow tube having a substantially circular cross-section.

In the embodiment shown in Figures 1 to 4 the engagement portion 56 includes six protrusions 57 extending therefrom (Figure 2). The access  
20 channel 54 includes six co-operable recesses 58. Other numbers and combinations of protrusions and recesses are also possible.

In this way only the key member 50 is engageable with the closure member 45 in such a way as to move the sealing member 52 into an open position.

25 In this first embodiment the closure member 45 is formed integrally with the container 30. In other embodiments of the invention the closure member may be secured to a conventional container, or removeably attached to the container.

30

Figure 1 shows two engagement members 59 extending circumferentially around the key member 50. These are engageable with a further engagement member 61 that extends circumferentially around the closure member 45. In this way a user may releasably engage the key member 50 and the closure member 45 together with the sealing member 52 in the closed position (Figure 4b) and the open position (Figure 4c).

Other types of engagement member are also possible.

10 In the first embodiment of the invention the closure member includes a shield member 62. The shield member 62 is secured within the conduit 53. The shield member 62 permits the dispensing of the contents of the container or addition of contents to the container, but prevents user or third-party access to the sealing member 52 via the conduit 53.

15 In the embodiment shown in Figure 1, the sealing member 52 includes a substantially rigid frame 63 (Figures 5 and 7). The frame includes six spring members 64, each of which protrude from an arm 66 that is part of the frame 63. The spring members 64 resiliently bias the sealing member 52 towards the closed position.

20 Figures 6 and 7 shows first 67 and second 68 sealing portions of the sealing member 52 according to the first embodiment of the invention. The sealing portions 67, 68 are or include a plastics material, e.g. silicone. The first sealing portion 67 is co-operable with the conduit 53 to seal the conduit 53. The second sealing portion 68 prevents the ingress or egress of container 30 contents via the access channel 54.

Other arrangements of frame 63 and sealing portions 67, 68 are also possible.

Figure 8 shows a liner 69. The liner 69 forms part of the closure member 45 and helps to define the conduit 53 and access channel 54.

- 5 A second embodiment of the closure according to the invention is designated generally by the reference numeral 71 (Figure 9).

The shield member 72 and sealing member 73 of the second embodiment of the invention differ from the shield member 62 and the sealing member 52  
10 of the first embodiment. Other features of the second embodiment of the invention that are identical to corresponding features of the first embodiment are designated by the same reference numerals.

Referring to Figures 9 to 12, the shield member 72 of the closure 71  
15 according to the second embodiment of the invention includes a leg 74 extending therefrom. The leg 74 is receivable in a cavity 76 in the sealing member 73. In this way the shield member 72 is moveable against a biasing force between a position displaced from the sealing member 73 (Figure 10) and a position adjacent to the sealing member 73 (Figure 11).

20

The shield member 72 may be resiliently biased towards to the position displaced from the sealing member 73 by a spring 77, e.g. a metal coil spring, as shown in Figures 12a to 12c.

- 25 In addition, the leg 74 and the cavity 76 may include mutually engageable locking members 78, 79. In the example shown in Figures 12a to 12c the mutually engageable locking members are a pair of barbs 78 in the cavity 76 and a radially extending protrusion 79 on the leg. Other locking members are also possible.

30

The locking members 78, 79 lock the shield member in a position adjacent to the sealing member so as to prevent movement of the sealing member 73 into the open position.

- 5     Figure 13 shows a preferred embodiment of retention member 81 for use in conjunction with the shield member 72. The retention member includes a narrower portion of conduit that prevents removal of the shield member 72.

10     Figure 14 shows a preferred embodiment of sealing member 73 according to the second embodiment of the invention. The sealing member 73 includes a substantially rigid frame 82. The frame includes four spring members 83, each of which protrude from an arm 84 that is part of the frame 82. The spring members 83 resiliently bias the sealing member 73 towards the closed position.

15     Figure 14 also shows a first 86 sealing portion that includes a stopper 87. Figure 15 shows a seal 88 that is attached to the liner 69 that forms part of the conduit 53. The stopper 87 and the seal 88 are co-operable to seal the conduit 53.

20     Other arrangements of frame 82 and sealing portions are also possible.

The choice of material for the stopper 87 and the seal 88 is influenced by the contents of the container with which they are to be used.

25     The sequence of engaging together the key member 50 and the closure member 45 of the closure 71 according to the second embodiment of the invention is shown in Figures 16a to 16c.

A third embodiment of the closure according to the invention is designated generally by the reference numeral 91 (Figure 17).

5 The closure member 93 and key member 94 of the third embodiment of the invention differ from the closure member 45 and the key member 50 of the first and second embodiments. Other features of the third embodiment of the invention that are identical to corresponding features of the first and second embodiments are designated by the same reference numerals.

10 Referring to Figures 17 to 21, the key member 94 of the closure 91 according to the third embodiment of the invention includes four protrusions 96 protruding therefrom. The access channel 97 includes four co-operable, first recesses 98. The access channel includes four second recesses 99, each in communication with a respective first recess 98. Each  
15 second recess 99 extends at an angle of ninety degrees from the first recess 98. It is also possible for the second recess 99 to extend at other angles from the first recess 98.

Each second recess 99 includes an elongate member 101 that extends  
20 through the body of the closure member 93. Each elongate member 101 is moveable, by a respective protrusion 96 on the key member 94, into engagement with the sealing member 73 so as to move the sealing member 73 into the open position. This movement takes place when the closure member 93 and the key member 94 are releasably engaged together.

25

The inclusion of the four elongate members 101 disposed between the key member 94 and the sealing member 73 provides an additional layer of security for the closure. The use of at least one elongate member 101 to move the sealing member 73 precludes the possibility of a third party

inserting an object into the access channel 97 in an attempt to move the sealing member 73 to the open position.

5 The sequence of engaging together the key member 94 and the closure member 93 of the closure 91 according to the third embodiment of the invention is shown in Figures 21a to 21c.

10 In a preferred embodiment of the invention the closure member 45, 93 includes a removable cap 102, as shown in Figures 22a and 22b. The cap 102 helps to keep the conduit 53 and access channel 54; 97 clean when the closure 40; 71; 91 and container 30 are not in use.

15 In use of the apparatus shown a user inserts the key member 45; 94 into the access channel 54; 97 in order to move the sealing member 52; 73 into the open position. This allows the user to either remove some or all of the contents of the container 30, or add contents to the container 30.

20 When the user no longer requires access to the contents of the container 30 he removes the key member 45; 94 from the access channel 54; 97 so that the sealing member 52; 73 returns to the closed position. The user can releasably retain the key member 45; 94 in a portion of the access channel 54; 97 via mutually engageable engagement members 59, 61.